

Claims

1. A metallic copper catalyst for use in an ethylene addition reaction to provide a  
5 polyfluoroalkylethyl iodide from a polyfluoroalkyl iodide and ethylene.

2. The metallic copper catalyst according to Claim 1, wherein the polyfluoroalkyl iodide is a compound represented by Formula (I):



wherein  $R_f$  is a  $C_{1-6}$  polyfluoroalkyl; and the polyfluoroalkylethyl iodide is a compound represented by Formula (II):

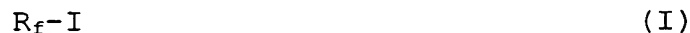


15 wherein  $R_f$  is as defined above.

3. A process for producing a polyfluoroalkylethyl iodide represented by Formula (II):



wherein  $R_f$  is a  $C_{1-6}$  polyfluoroalkyl,  
20 the process comprising the step of reacting ethylene with a compound represented by Formula (I):



wherein  $R_f$  is as defined above, in the presence of a metallic copper catalyst.

25 4. The process according to Claim 3, wherein the

metallic copper catalyst is a powdery metallic copper or a metallic copper supported on a carrier, and the reaction is conducted at a temperature of 50-200°C under a pressure of 0.01-3 MPa.

5                    5. A process for producing polyfluoroalkylethyl iodide (IV), the process comprising steps (a) and (b) conducted in the presence of the same metallic copper catalyst:

                  (a) a step of reacting tetrafluoroethylene with  
10 a compound represented by Formula (I):



wherein  $R_f$  is a  $C_{1-6}$  polyfluoroalkyl, to produce a compound represented by Formula (III):



15 wherein  $n$  is an integer from 1 to 8 and  $R_f$  is as defined above; and

                  (b) a step of reacting ethylene with compound (III) obtained in step (a) to produce a polyfluoroalkylethyl iodide represented by Formula (IV):



wherein  $R_f$  and  $n$  are as defined above.

                  6. A process for producing polyfluoroalkylethyl acrylate (VI), the process comprising steps (a), (b) and (c), steps (a) and (b) being conducted in the presence of  
25 the same metallic copper catalyst:

(a) a step of reacting tetrafluoroethylene with a compound represented by Formula (I):



wherein  $R_f$  is a  $C_{1-6}$  polyfluoroalkyl, to produce a compound  
5 represented by Formula (III):



wherein  $n$  is an integer from 1 to 8 and  $R_f$  is as defined above;

(b) a step of reacting ethylene with compound  
10 (III) obtained in step (a) to produce a compound represented by Formula (IV):



wherein  $R_f$  and  $n$  are as defined above; and

(c) a step of reacting compound (IV) obtained in  
15 step (b) with a carboxylate represented by Formula (V):



wherein  $X$  is H or  $CH_3$  and  $M$  is an alkali metal, to produce a polyfluoroalkylethyl acrylate represented by Formula (VI):



wherein  $R_f$ ,  $n$  and  $X$  are as defined above.

7. A process for producing a polyfluoroalkylethyl acrylate represented by Formula (VII):



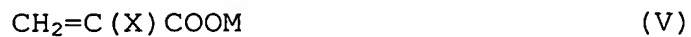
wherein  $R_f$  is a  $C_{1-6}$  polyfluoroalkyl, and X is H or  $CH_3$ ,

the process comprising reacting a  
polyfluoroalkylethyl iodide obtained according to the  
production process of Item 3 and represented by Formula

5 (II):



wherein  $R_f$  is as defined above, with a carboxylate  
represented by Formula (V):



10 wherein X is as defined above, and M is an alkali metal.